Polarity of covalent bond.

A covalent bond in which electrons are shared equally between bonded atoms, is called non polar covalent bond while a covalent bond, in which electrons are shared unequally and the bonded atoms acquire a partial positive and negative charge, is called a polar covalent bond. The atom having higher electronegativity draws the bonded electron pair more towards itself resulting in partial charge separation. This is the reason that HCl molecule in vapour state contains polar covalent bond

Polar covalent bond is indicated by notation : $\overset{+\delta}{H} - \overset{-\delta}{Cl}$

(1) Bond polarity in terms of ionic character : The polar covalent bond, has partial ionic character. Which usually increases with increasing difference in the electronegativity (EN) between bonded atom

H – F		H – Cl		H – Br		H – I			
EN	2.1	4.0	2.1	3.0	2.1	2.8	2.1	2.5	
Difference in EN	1.9		0.9		0.7		0.4		

Ionic character decreases as the difference in electronegativity decreases

(2) Percentage ionic character : Hennay and Smith gave the following equation for calculating the percentage of ionic character in A–B bond on the basis of the values of electronegativity of the atoms A and B.

Percentage of ionic character = $[16\,(\chi_A - \chi_B) + 3.5\,(\chi_A - \chi_B)^2]$.

Whereas $(x_A - x_B)$ is the electronegativity difference. This equation gives approximate calculation of percentage of ionic character, e.g., 50% ionic character corresponds to (xA ~ xB) equals to 1.7.